

PERFORMANCE SPECIFICATION

CAPACITOR, FIXED, CERAMIC DIELECTRIC (TEMPERATURE COMPENSATING),
ESTABLISHED RELIABILITY AND NON-ESTABLISHED RELIABILITY,
GENERAL SPECIFICATION FOR

This amendment forms a part of MIL-PRF-20H, dated 27 February 1992, and is approved for use by all Departments and Agencies of the Department of Defense.

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- * EIA-554 reference at top of page, delete and substitute:

"EIA-554-1 - Assessment of Average Outgoing Quality Levels in Parts Per Million (ppm). (DoD adopted)"

- 3.2, last sentence, delete and substitute:

"Authorized distributors that are approved to MIL-STD-790 distributor requirements by Qualified Products List (QPL) manufacturers are listed in the QPL."

- 3.3.2.1, following the subparagraphs, add:

"In addition, the manufacturer shall demonstrate control of the temperature coefficient of capacitance and lead integrity in the process."

- * 3.3.2.2 and 3.3.2.3, delete and substitute:

"3.3.2.2 PPM system. As part of the overall MIL-STD-790 QPL system, the manufacturer shall establish a ppm system for assessing the average outgoing quality of lots in accordance with EIA-554-1. Data exclusion, in accordance with EIA-554-1, may be used with approval of the qualifying activity. The ppm system shall identify the ppm rate at the end of each month and shall be based on a six month moving average."

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- * 3.5.3.2b, delete and substitute:

"b. PPM data following solder dip/reforming shall be reported each six months. The calculation method shall be in accordance with EIA-554-1."

- 3.6, Dielectric withstanding voltage (at 25°C) test, add the following:

"Not applicable if optional voltage conditioning was performed at or above 300 percent of rated voltage."

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3.13.1, PPM/°C equation, delete and substitute:
$$^{\circ}\text{PPM} / ^{\circ}\text{C} = \frac{C_2 - C_1}{C_1 (T_2 - T_1)} \times 10^6$$

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* 4.4.5, delete the last 2 sentences.

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* 4.5g, delete and substitute:

“g. PPM assessment.”

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* TABLE VII, delete and substitute:

“TABLE VII. Group A inspection (ER).”

Inspection	Requirement paragraph	Test method paragraph	Sampling procedure
<u>Subgroup 1</u> Thermal shock and voltage conditioning <u>1/</u>	3.6	4.7.2	100% inspection
<u>Subgroup 2</u> Visual and mechanical examination, external: Physical dimensions Marking <u>2/</u> Workmanship	3.1 3.4, 3.5 3.25 3.26	4.7.1 4.7.1 4.7.1 4.7.1	See table VIII
<u>Subgroup 3</u> Solderability (when specified, see 3.1) <u>3/</u>	3.19	4.7.15	5 samples, 0 failures
<u>Subgroup 4</u> Radiograph inspection (FR level “S” only)	3.22	4.7.19	100% inspection

1/ Post checks are required in accordance with 3.6.

2/ Marking defects are based on visual examination only. Any subsequent electrical defects shall not be used as a basis for determining marking defects.

3/ The manufacturer may request deletion of subgroup 3 solderability test, provided an in-line or process control system for assessing and assuring the solderability of leads can be validated and approved by the qualifying activity. Deletion of the test does not relieve the manufacturer from meeting this test requirement.”

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* TABLE VIII, delete and substitute:

"TABLE VIII. Sampling plans for subgroup 2.

Lot size	Sample size
1- 13	100%
14- 150	13
151- 280	20
281- 500	29
501- 1,200	34
1201- 3,200	42
3201- 10,000	50
10,001- 35,000	60
35,001-150,000	74
50,001-500,000	90
500,001-Up	102

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* 4.6.1.2.1.2 through 4.6.1.2.1.5, delete and substitute:

"4.6.1.2.1.2 Subgroup 2.

4.6.1.2.1.2.1 Sampling plans. Subgroup 2 tests shall be performed on an inspection lot basis. Samples subjected to subgroup 2 shall be selected in accordance with table VIII, based on the size of the inspection lot. In the event of one or more failures the lot shall be rejected.

4.6.1.2.1.2.2 Rejected lots. The rejected lot shall be segregated from new lots and those lots that have passed inspection. The rejected lot shall be 100 percent inspected for those quality characteristics found defective in the sample and any defectives found shall be removed from the lot. A new sample of parts shall then be randomly selected in accordance with table VIII. If one or more defects are found in this second sample, the lot shall be rejected and shall not be supplied to this specification.

4.6.1.2.1.3 Subgroup 3 (solderability).

4.6.1.2.1.3.1 Sampling plan. Five samples shall be selected randomly from every inspection lot and subjected to the subgroup 3 solderability test. The manufacturer may use electrical rejects from the Subgroup 1 screening tests for all or part of the samples to be used for solderability testing. If there are one or more defects, the lot shall be considered to have failed.

4.6.1.2.1.3.2 Rejected lots. In the event of one or more defects, the inspection lot shall be rejected. The manufacturer may use one of the following options to rework the lot:

- a. Each production lot that was used to form the failed inspection lot shall be individually submitted to the solderability test as required in 4.6.1.2.1.3.1. Production lots that pass the solderability test are available for shipment. Production lots failing the solderability test can be reworked only if submitted to the solder dip procedure in item 4.6.1.2.1.3.2b.

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b. The manufacturer shall submit the failed lot to a 100 percent solder dip. Two hundred sample units (or 100 percent of the lot, whichever is less) from this lot shall then be subjected to all group A, subgroup 1 post-electrical tests, with no defects allowed.

- (1) If the 200 sample units (or 100 percent of the lot, whichever is less) pass the group A, subgroup 1 post-electrical tests, 5 additional units shall then be subjected to the solderability test, with no defects allowed. If there are one or more defects, the lot shall be considered rejected and shall not be furnished against the requirements of this specification.
- (2) If the 200 sample units (or 100 percent of the lot, whichever is less) fail group A, subgroup 1 post-electrical tests, these tests shall be performed on 100 percent of the lot. The lot must meet the 5 PDA requirement as specified in 4.6.1.2.1.1. If the 5 percent PDA requirement is not met, the lot shall be considered rejected and shall not be furnished against the requirements of this specification. If the 5 percent PDA requirement is met, 5 sample units shall be subjected to the solderability testing criteria of 4.6.1.2.1.3.2b(1).

4.6.1.2.1.3.3 Disposition of samples. The solderability test is considered a destructive test and samples submitted to the solderability test shall not be supplied on the contract.

4.6.1.2.1.4 Subgroup 4 (radiographic inspection) (FR level "S", when specified, see 3.1). The subgroup 5 test shall be performed on each capacitor offered for inspection. Capacitors not meeting the inspection criteria shall be removed from the production lot and shall not be supplied to this specification.

4.6.1.2.1.5 PPM calculations. The manufacturer shall establish a ppm system in accordance with 3.3.2 for assessing and calculating average outgoing quality of capacitors. A ppm rate combining capacitance, DF, IR (25°C), and DWV shall be assessed for lots that have passed the group A inspection. The manufacturer's ppm system shall also address rectification procedures for lots failing ppm assessment. Data from the rectification process shall not be used to calculate ppm."

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Table X, delete and substitute:

"Table X. Group B inspection.

Inspection	Requirement paragraph	Test method paragraph	Number of sample units to be inspected	Number of defectives permitted <u>1/</u>	
<u>Every 2 months 2/</u> Temperature coefficient and capacitance drift	3.13	4.7.9.2	12	0	
<u>Every 2 months 3/</u> <u>Subgroup 1 4/</u> Shock, specified pulse <u>5/</u> Vibration, high frequency <u>5/</u> Thermal shock and immersion cycling <u>5/</u>	3.14 3.15 3.16	4.7.10 4.7.11 4.7.12	12	1	1
<u>Subgroup 2 4/</u> Terminal strength (direct load) <u>5/</u> Resistance to soldering heat (when specified, see 3.1) Moisture resistance	3.17 3.20 3.18	4.7.13 4.7.16 4.7.14	12	1	
<u>Subgroup 3 6/</u> Marking legibility (laser marking only) <u>5/</u> Resistance to solvents (ink marking only) <u>5/</u>	3.25.3 3.23	4.7.18 4.7.20	6	1	
<u>Every 2 months</u> Life (at elevated ambient temperature)	3.21	4.7.17.2	12	<u>7/</u>	

- 1/ A sample unit having one or more defects shall be considered a single defective.
- 2/ If the manufacturer can demonstrate that this test has been performed five consecutive times with zero failures, the frequency of this test, with the approval of the qualifying activity, can be performed on an annual basis. If the design, material, construction, or processing of the part is changed or, if there are any quality problems or failures, the qualifying activity may require resumption of the original test frequency.
- 3/ Subgroup 1 and subgroup 2 shall be checked during alternate bimonthly periods.
- 4/ Subgroup 1 tests may be performed on sample units that have been subjected to and have passed the monthly inspection, when these sampling periods coincide.
- 5/ If the manufacturer can demonstrate that this test has been performed five consecutive times with zero failures, this test, with the approval of the qualifying activity, can be deleted. The manufacturer, however, shall perform this test every three years after the deletion as part of long term design verification. If the design, material, construction, or processing of the part is changed or, if there are any quality problems, the qualifying activity may require resumption of the specified testing. Deletion of testing does not relieve the manufacturer from meeting the test requirement in case of dispute.
- 6/ Applicable to new design styles (ER and non-ER) only.
- 7/ For non-ER, one defective is permitted. For ER, the number of allowable defectives may vary with the failure rate level of the part being tested."

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- * 4.7.6.1 title, delete and substitute:

"Body insulation (qualification only, when specified, see 3.1)."

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- * 4.7.14.b, add to end:

"Vibration cycle of step 7b shall not be performed."

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- * 4.7.14c, line 3, delete "60 percent maximum" and substitute "30 percent to 60 percent".

- * 4.7.16b, delete and substitute:

"b. Test condition: B."

The margins of this amendment are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous amendment.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

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Review activities:
Army - MI
Navy - AS, MC, OS, SH
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